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EXAMINER

.KRASNIC, BERNARD

ART UNIT PAPER NUMBER

2621

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/698,111

Applicant(s)

HARVILLE, MICHAEL

Examiner

Bernard Krasnic

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1-26-2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference number "135" in Fig. 1A, reference number "500" in Fig. 5.
2. The drawings are objected to because the process in Fig. 8 is referenced "730" instead of -- 800 -- as described by the specifications in page 25, line 18. Also the process in Fig. 9 is referenced as "840" instead of -- 900 -- as described by the specifications in page 26, line 19.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

Page 6, line 1: "BEST MODE FOR CARRYING OUT THE INVENTION" should be -- DETAILED DESCRIPTION OF THE INVENTION --.

Page 17, line 15: "180may" should be -- 180 may --.

Page 17, line 17: "processing may be include" should be -- processing may include --.

Page 25, lines 14 and 16: "process 730" should be -- process 800 --.

Page 26, lines 15 and 17: "process 840" should be -- process 900 --.

Appropriate correction is required.

Claim Objections

4. Claims 5 and 31 are objected to because of the following informalities:

Re Claim 5, line 3: "cloud of said subset" should be -- cloud of a subset --.

Re Claim 31, line 6: A period should be inserted after "at said classifier".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 2, 4, 6, 9, 11, 13-15, 18, 23, 24, 26, and 28-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Carrot et al (US 6909792 B1).
Re Claim 1: Carrot discloses a method for visual-based recognition (see Abstract, lines 1, and 11-15) of an object / breast, said method comprising receiving depth data (see Fig. 7, col. 6, line 21, depth or z') for at least a pixel of an image of an object, said depth data comprising information relating to a distance from a visual sensor (see col. 6, lines 5-26, distance from the ultrasonic scanner to the different parts of the breast tissue) to a portion of said object / breast shown at said pixel; generating a plan-view image / slice (167) (see Fig. 7, col. 9, lines 22-23) based in part on said depth data; extracting a plan-view template / entire slice (167) (see Fig. 7, Abstract, lines 11-15, historical images, registered images from previous scanning of the breast tissue, the template may be the entire plan-view image itself) from said plan-view image; and processing said plan-view template at a classifier / correlator (30) (see Fig. 1, col. 2 line 45-

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47), wherein said classifier is trained to make a decision (see Abstract, lines 11-15, tumor growth or shrinkage) according to pre-configured parameters.

Re Claim 2: Carrot discloses receiving non-depth data / color (see col. 2, line 57, multicolor imagery) for said pixel.

Re Claim 4: Carrot discloses selecting a subset / ROI of said depth data / multicolored data based on foreground segmentation / thresholding multicolored data (see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 6: Carrot discloses receiving non-depth data / multicolored data for said pixel, and wherein said foreground segmentation / thresholding multicolored data is based at least in part on said non-depth data (see col. 1, lines 64-66, Abstract, lines 13-15, thresholding on ROI colored image, col. 3, lines 58-60).

Re Claim 9: Carrot discloses extracting said plan-view template from said plan-view image is based at least in part on object tracking / ROI (see col. 3, lines 25-36 and 40-43, tracking ROI).

Re Claims 11: Carrot discloses said plan-view image is based in part on said non-depth data (see col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 13: Carrot discloses said plan-view image comprises a value based at least in part on an estimate of height / depth z' of a portion of said object / breast above a surface /pressure plate (83, 84) (see Fig. 3, col. 5, lines 59-61, the depth is considered as an estimate of height a result of the breast being on a pressure plate).

Re Claim 14: Carrot discloses said plan-view image comprises a value based at least in part on color data for a portion of said object (see Abstract, lines 13-15, col. 1, lines 64-65, col. 3, lines 4-8, col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 15: Carrot discloses said plan-view image comprises a value based at least in part on a count of pixels / ROI obtained by said visual sensor and associated with said object (see col. 3, lines 27-44, col. 4, lines 26-28, ROI has a certain amount or count of pixels).

Re Claim 18: Carrot discloses performing height normalization / depth z' based on pressure plate (83, 84) on said plan-view template / slice (167) (see Figs. 3 and 7, col. 5, lines 59-61, the depth is considered as a height normalization as a result of the breast being on a pressure plate, the three dimensional image is therefore dependent upon the height normalization and therefore each template or slice is dependent upon the height normalization).

Re Claim 23: Carrot discloses a visual-based recognition system comprising a visual sensor (20) (see Fig. 1, col. 2, lines 41-45, Abstract, lines 1, and 11-15) for capturing depth data (see Fig. 7, col. 6, line 21, depth or z') for at least a pixel of an image of an object / breast, said depth data comprising information relating to a distance from said visual sensor (see col. 6, lines 5-26, distance from the ultrasonic scanner to the different parts of the breast tissue) to a portion of said object visible at said pixel; a plan-view image generator (20,24) (see col. 6, lines 27-55) for generating a plan-view image / slice (167) (see Fig. 7, col. 9, lines 22-23) based on said depth data; a plan-view template generator (20,24) (see col. 6, lines 45-50, access historical images) for generating a plan-view template / slice (167) (see Fig. 7, Abstract, lines 11-15, historical images, registered images from previous scanning of the breast tissue, the template may be the entire plan-view image itself) based on said plan-view image; and a classifier / correlator (30) (see Fig. 1, col. 2 line 45-47) for making a decision concerning recognition (see Abstract, lines 11-15, tumor growth or shrinkage) of said object, wherein said classifier is trained to make a decision according to pre-configured parameters.

Re Claim 24: Carrot discloses said visual sensor is also for capturing non-depth data / color (see col. 2, line 57, multicolor imagery).

Re Claim 26: Carrot discloses a pixel subset selector (52, 24) for selecting a subset / ROI of pixels of said image, wherein said pixel subset selector is

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operable to select said subset of pixels based on foreground segmentation / thresholding multicolored data (see Figs. 1 and 2a, see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 28: Carrot discloses said plan-view image is based in part on said non-depth data (see col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 29: Carrot discloses to generate a three-dimensional point cloud / three dimensional data set based on said depth data / direction z' , wherein a point of said three-dimensional point cloud comprises a three-dimensional coordinate / x' , y' , z' (see Fig. 7, col. 3, lines 4-7, col. 6, lines 20-21).

Re Claim 30: Carrot discloses to divide said three-dimensional point cloud / three dimensional data set into a plurality of slices such that a plan-view image (167) may be generated for at least one slice of said plurality of slices (see Fig. 7, col. 3, lines 4-7, col. 9, lines 16-27).

Re Claim 31: Carrot discloses to extract a plan-view template / slice (167) from at least two plan-view images / plurality of slices corresponding to different slices of said plurality of slices, wherein said plan-view template comprises a transformation / summing data points of at least a portion of said plan-view

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images / entire slice, such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5, 7, 8, 32, 33, 35-37, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot as applied to claims 1 and 23 above.

Re Claim 5 and 32 respectively: Carrot, as recited in claim 5, discloses generating a three-dimensional point cloud / three dimensional data set of said subset / ROI of pixels based on said depth data / direction z' (col. 3, lines 27-37 and 40-43, col. 6, lines 20-21, wherein a point of said three-dimensional point cloud comprises a three-dimensional coordinate / x' , y' , z' (see Fig. 7, col. 3, lines 4-7); partitioning said three-dimensional point cloud into a plurality of vertically oriented bins; and mapping at least a portion of points of said plurality of vertically oriented bins into at least one said plan-view image / ROI or slice addition based on said three- dimensional coordinates, wherein said plan-view image is a two-dimensional representation / slice of said three-dimensional point

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cloud comprising at least one pixel corresponding to at least one vertically oriented bin of said plurality of vertically oriented bins (see col. 3, lines 27-37 and 40-43, ROI may cover these vertical bins, col. 9, lines 22-26, addition of all the possible slices will then cover all the bins).

Although the partitioning step of Carrot's three dimensional cloud is not specifically disclosed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the vertical bin is each depth or z' axis point, so for example, if the point [x',y'] is looked at, all the same points [x',y'] along the different z' values creates a vertical bin.

As to claim 32, all the limitations are taught by Carrot in the same manner as Carrot taught claims 1, 5, and 6 respectively above.

Re Claim 7: Carrot discloses dividing said three-dimensional point cloud into a plurality of slices (164, 167), and wherein said generating said plan-view image / slice (167) is performed for at least one slice of said plurality of slices (see Fig. 7, col. 3, lines 4-7).

Re Claim 8: Carrot discloses extracting a plan view template / slice (167) from at least two plan-view images / plurality of slices corresponding to different slices of said plurality of slices, wherein said plan-view template comprises a transformation / summing data points of at least a portion of said plan-view images / entire slice, such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Claims 7 and 8 are dependent on claim 5.

Re Claim 33: Carrot discloses said three-dimensional point cloud / three dimensional data set and said plan-view image / entire slice (167) are also based at least in part on non-depth data / multicolored data (see Fig. 7, col. 1, lines 64-65, col. 3, lines 4-7, Abstract, lines 11-15).

Re Claim 35: Carrot discloses extracting a plan-view template / entire slice (167) from said plan-view image / slice (167), wherein said plan view template comprises a transformation / summing data points of at least a portion of said plan view image / entire slice (167), and such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Re Claim 36: Carrot discloses dividing said three-dimensional point cloud / three dimensional data set of into a plurality of slices, and wherein said mapping / summing data points at least a portion of points comprises mapping points within a slice of said plurality of slices of said three-dimensional point cloud into said plan-view image / slice (see col. 3, lines 4-7, col. 9, lines 22-27).

Re Claim 37: Carrot discloses comprising extracting a plan-view template / entire slice (167) from said plan-view image / slice, wherein said plan view template comprises a transformation / summing data points of at least a portion of said

plan view image / entire slice (167), such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Re Claim 39: Carrot discloses said plan-view image / slice is generated from a subset / ROI of pixels of said image selected based on foreground segmentation / thresholding multicolored data (see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 40: Carrot discloses extracting a plan view template / entire slice (167) from at least two plan view images corresponding to different slices of said plurality of slices, wherein said plan view template comprises a transformation / summing of data points of at least a portion of said plan view images / entire slice (167), such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Claims 33, 35-37, 39 and 40 are dependent on claim 32.

9. Claims 3, 10, 12, 16, 17, 19-22, 25, 27, 34, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot as applied to claims 1, 23 and 32 above, and further in view of Li et al (US 2003/0108244 A1).

However, Carrot fails to teach of fairly suggest depth data is determined by stereopsis, that the classifier is a support vector machine, that the plan-view template is a vector basis obtained by principal component analysis (PCA), and

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that a decision is to distinguish between a human, non-human, and different bodies.

Li, as recited in claim 3 and claim 34 respectively, discloses said depth data using stereopsis / one or more cameras based on image correspondences (see page 6, right col., line 7).

Li, as recited in claim 10, discloses said classifier is a support vector machine / SVM's (see page 1, paragraph [0008], lines 18-24, slices or plan-view image will be affected by SVM's).

Li, as recited in claim 12, discloses said object is a person (see page 1, paragraph [0005], lines 17-19, paragraph [0007], last two lines, "face and non-face classification").

Li, as recited in claim 16, discloses Re Claim 16: The method as recited in Claim 1 wherein said plan-view template is represented in terms of a vector basis / SVM's (see page 1, paragraph [0008], lines 18-24, since slices or plan-view image will be affected by SVM's, so will the templates since the template is the entire slice).

Li, as recited in claim 17, discloses said vector basis is obtained through principal component analysis (PCA) (see page 1, paragraph [0008], lines 18-24, "PCA as they rotate and use the SVM's").

Li, as recited in claim 19, discloses said decision is to distinguish between a human and a non-human (see page 1, paragraph [0005], lines 17-19, paragraph [0007], last two lines, "face and non-face classification").

Li, as recited in claim 20, discloses said decision is to distinguish between a plurality of different human body orientations (see page 2, paragraph [0016], page 4, paragraph [0039], lines 13-15, classes of view ranges being left profile, left half profile, frontal, etc.).

Li, as recited in claim 21, discloses said decision is to distinguish between a plurality of different human body poses / face poses (see page 7, paragraph [0073], last two lines, page 4, paragraph [0039], lines 13-15).

Li, as recited in claim 22, discloses said decision is to distinguish between a plurality of different classes / position of people (see page 2, paragraph [0016], page 4, paragraph [0039], lines 13-15, "classes of view ranges").

Li, as recited in claim 25, discloses said visual sensor determines said depth data using stereopsis / one or more cameras based on image correspondences (see page 6, right col., line 7).

Li, as recited in claim 27 and claim 38 respectively, discloses said classifier is a support vector machine / SVM's (see page 1, paragraph [0008], lines 18-24, "PCA as they rotate and use the SVM's for multi-pose face detection").

Therefore, in view of Li, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Carrot's visual-based recognition method and system by including the capabilities of stereopsis for determining depth data, the classifier being a support vector machine, the plan-view template being a vector basis obtained by principal component analysis (PCA), and a decision by the classifier being to distinguish between a human,

non-human, and different bodies, to the receiving depth data and processing the plan-view template steps of Carrot in order to detect a person's face in real time, in input images containing either frontal or non-frontal views regardless of the scale or illumination conditions associated with the face.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Geng et al discloses a three-dimensional ear biometrics system and method; Wilson et al discloses an architecture for controlling a computer using hand gestures; Bradski et al discloses a method, apparatus and system for using computer vision to identify facial characteristics; Krebs et al discloses methods and systems for distinguishing individuals utilizing anatomy and gait parameters; Cohen et al discloses gesture-controlled interfaces for self-service machines and other applications; Park et al discloses apparatus and method for extracting object based on feature matching between segmented regions in images; Kunieda discloses a radiotherapy device; Freeman et al discloses a system for reconstructing the 3-dimensional motions of a human figure from a monocularly-viewed image sequence; Krumm et al discloses a system and process for identifying and locating people or objects in a scene by selectively clustering three-dimensional regions; Harville et al discloses a plan-view projections of depth data for object tracking; Mihara et al discloses an image recognition method and apparatus.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-1357. The examiner can normally be reached on Mon-Thur 7:30am-5:00pm and every other Friday 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jong-Suk (James) Lee can be reached on (571) 272-7044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bernard Krasnic
December 7, 2006



JONG SUK LEE
SUPERVISORY PATENT EXAMINER